

Support for Amendment:

Independent claims 1 and 58 are amended to clarify that the claimed mixture is in a dry-powder form. This amendment is supported by the specification at, for example, page 9, lines 3-7, and page 10, lines 16-21. In addition, see the specification beginning at page 25, line 1.

Independent claims 1 and 58 are amended to clarify that the antioxidising effect is on surrounding soil and air just above ground level. This is supported by the application at, for example, page 5, lines 14-18, and page 21, line 38 through page 22, line 26.

Independent claim 58 is amended by rearranging the limitation from part (a)(ii) to a location following the recitation of the pigment.

The dependent claims are amended in order to correct antecedent and to clarify that certain components are present in the amount indicated rather than “added” in the amount indicated.

No new matter is introduced by this Amendment and entry thereof is requested. Upon entry, claims 1, 3-12, 14, 15, 18, 20, 22, 24, 26, 28, 30, 32, and 58-70 are active in this application.

Remarks:

Examiner Son Nguyen is thanked for the discussion of the issues in this application held on December 14, 2010. The discussion focused on clarifying the claims by characterizing the mixture as a mixture in dry-powder form in order to more clearly distinguish from the prior art of record. This discussion is summarized and further expanded upon in the following remarks.

35 U.S.C. § 103(a) Rejection over Morgan and Mankiewicz:

The outstanding Office Action includes a prior art-based rejection of claims 1, 3, 5, 7, 8, 14, 15, 18, 20, 22, 24, 26, 28, 30, 32, 58, and 60-70 under 35 U.S.C. § 103(a) over U.S. Patent No. 6,029,395 to Morgan and U.S. Patent No. 6,946,496 to Mankiewicz. This rejection is traversed.

The present invention according to independent claim 1 is directed at a mixture in dry-powder form. The mixture in dry-powder form can be used to form a film or membrane for treating a soil surface or a soil mass. The mixture in dry-powder form includes a water-soluble, dried and ground organic raw material, a thickening agent, and a pigment. Furthermore, at least one component of the mixture in dry-powder form has a sufficient antioxidantizing effect to ensure that the film or membrane has an antioxidantizing effect on surrounding soil. Furthermore, the mixture in dry-powder form is saturated with electrons to at least electrical neutrality. The film or membrane is formed by spreading the mixture over the soil surface or by arranging the mixture in the soil mass. According to independent claim 58, at least a portion of the film or membrane is formed at some distance down in the soil when the mixture is either spread over the soil surface or arranged in the soil mass.

Morgan discloses a biodegradable mulch mat comprising an air and water permeable, light impermeable, open celled, composite of granules and fibers in a binder matrix prepared from a foam precursor. See Morgan at the Abstract. The Examiner's attention is directed to Morgan beginning at column 4, line 8. This portion of Morgan describes preparing mulch mats from "foamed slurries of fiber, granules, binder and surfactant in an aqueous medium." See Morgan at column 4, lines 8-9. As further described by Morgan, "on an air free basis useful slurries can comprise from about 5 to 35 weight percent solids." See Morgan at column 4, lines 15-17. Clearly, the foamed slurries described by Morgan for preparing a mulch mat are not a mixture in dry-powder form according to the presently claimed invention. Furthermore, Morgan describes the slurries for forming the mulch mat of his invention "tend to be stable and can be stored for extended periods." See Morgan at column 4, lines 29-31. Clearly, Morgan does not disclose a mixture in dry-powder form for forming a film or membrane according to the presently claimed invention.

The outstanding Office Action recognizes that "Morgan teaches a film or membrane forming mixture (the mixture is a slurry sprayed over soil to form a film or membrane, col. 1, lines 60-61, col. 5, lines 65-67, col. 6, lines 1-30, col. 7, lines 16-24)." See the outstanding Office Action at page 2. Clearly, a slurry is not a mixture in dry-powder form according to the presently claimed invention.

The mixture in dry-powder form according to the presently claimed invention forms a film or membrane as a result of spreading the mixture over the soil surface or by arranging the mixture in the soil mass. The Examiner's attention is directed to the specification at, for example, page 9, lines 3-7, where a dry-powder mixture is described as "sprinkled over the soil" to form the film or membrane.

The outstanding Office Action recognizes that "Morgan is silent about wherein the powder mixture is saturated with electrons to at least electrical neutrality." See the outstanding

Office Action at page 3, lines 1-2. This feature is in both independent claims 1 and 58. It is pointed out, however, that there are several additional differences between the present invention and Morgan. Each of these differences is discussed in turn.

Morgan fails to teach or suggest a mixture in dry-powder that includes at least one component having a sufficient antioxidanting effect to ensure that a formed film or membrane has an antioxidanting effect on the surroundings according to claims 1 and 58. Instead, Morgan discloses the use of an anti-oxidising compound that may be added to aqueous foam in order to increase the UV-light resistance of the mulch mat itself. See Morgan at column 5, lines 1-5. As such Morgan makes no suggestion regarding the use of antioxidants in sufficient amounts to produce an antioxidanting effect on the surrounding environment. Because Morgan only discloses that the binder leaches into the top soil, there is no teaching or suggestion in Morgan that foam containing any antioxidant would penetrate into the area surrounding the mat. See Morgan at column 4, lines 1-8.

Additionally, and as can be seen from the above-identified application at page 21, line 38 through page 22, line 26, a feature of the disclosed membrane is the ability of the membrane to destroy oxidants in the micro air-layer just above the soil surface (i.e. the surroundings specified in claims 1 and 58). This feature protects the plants from damages caused by formation of ozone in the top soil when illuminated by sun light. Formation of ozone in the top soil is as far as the inventor knows a discovery made by the inventor and represents the unobvious discovery of a new problem. No prior art of the inventor's knowledge teaches the importance of destroying ozone and other oxidisers in the air just above the top soil (including of course; the top layer of the soil). Plant damages due to ozone and other oxidants have traditionally been reckoned as an air-borne pollution problem, and not a problem of ozone formation in the soil surface. Thus a skilled person in the art, believing that ozone damage was airborne problem having no relationship to the soil itself, would not have been lead by the cited prior art to arrive at the

claimed invention and specifically to the claimed feature of at least one of the compounds having a sufficient antioxidant effect on the surroundings. Thus a skilled person would have no incentive for making an anti-oxidising membrane into the top soil to protect the vulnerable plant roots/young plants, nor would the skilled person read the cited prior art with the aim of finding such a plant root protecting membrane. The closest cited prior art providing a mat with many of the similar properties, Morgan, teaches the opposite, to form a protective mat on-top of the soil. Based on at least the foregoing reasoning, claims 1 and 58 are patentable over Morgan.

Morgan fails to disclose a mixture for forming a film or membrane according to claims 1 and 58. Instead, Morgan discloses a mulch mat that is formed in aqueous foam. See Morgan at column 4, lines 8-9. The claimed invention is a powder mixture which, when dissolved in water or other polar solvents and administered to a soil surface, will penetrate a distance into the soil surface and set into a solid mechanically and chemically protective membrane. The membrane will endure for at least a couple of weeks, but may last an entire growth season or more, depending upon amounts and composition of the powder mixture. The mechanically and chemically protective membrane has a combined effect in that it is mechanically solid, wear resistant, water penetrable, water stabilizing (retains moisture), antioxidant, and temperature regulating for the above mentioned period of time. This combined effect provides plants with a protection against oxidants, disadvantageous temperatures, and drought through at least a part of the growth season. The claimed invention should thus not be considered as a fertilizer or mulch composition, it is primarily powder mixture forming a mechanically and chemically protective membrane in the top soil. The membrane has a secondary effect of being biodegradable and acting as a fertilizer, but only after servicing as the primary mechanically and chemically protective membrane.

A powder amount of 1 g per square meter soil surface corresponds to a need for only 10 kg of the powder per hectare land, which is at least one order of magnitude (often several orders

of magnitude) lower than any comparable prior art. As mentioned previously, Morgan requires fibers in the general amount of at least 54 g per square meter. See Morgan at column 6, lines 58-67. The effectiveness of the claimed invention drives the costs down to a level where it becomes economically viable to employ the invention in a very large scale such as geo-engineering entire landscapes by changing the albedo. The specific combination of protections provided by this coating has shown impressively good results in various test sites with very different climate conditions in Kuwait, Egypt, Spain, and Norway in enhancing plant growth and in making barren land arable. Further, please note that the powder mixture according to the claimed invention does not include a reinforcing compound, but instead the cover/membrane forming mixture penetrates into and binds particulate material in the soil to give the necessary mechanical strength to the resulting membrane. This is believed to be one reason for the low dosages of dry powder required to make an effective membrane.

Morgan fails to disclose or suggest a mixture for forming a film or membrane wherein at least a portion of the film or membrane is formed at some distance down in the soil mass when the mixture is spread over the soil surface, arranged in the soil mass, or both, as specified in claim 58. Instead, and as stated previously, Morgan discloses a mulch mat having fibers that is disposed on the top surface of the soil. The claimed invention does not use fibres in the powder mixture since the aim of this membrane forming solution is to make the membrane form mainly into the soil, and not on-top of the soil. This difference makes it possible to obtain the same effects of fertilizing, erosion protection, temperature regulation etc. as the mat according to Morgan, but with only 1 - 3 g dry matter per square meter soil surface as opposed to about at least 54 g dry matter per square meter in Morgan. This is a difference of 2 to 3 orders of magnitude, and is a clear indication that it should not be considered obvious to a skilled person.

Mankiewicz discloses artificial soil including a plurality of foam plastic fragments. See the abstract of Mankiewicz. Mankiewicz describes the artificial soil in the context of Figures 1

and 2 beginning at column 3, line 4. The artificial soil is shown at reference 10 and includes fragments 14 of a light-weight foam plastic having a colloidal gel coating thereon, and forms a matrix 12 having pores 20. The outstanding Office Action apparently relies upon Mankiewicz for the disclosure of negative electric charges at column 7, lines 40-60. It is not seen where this portion of Mankiewicz actually discloses or suggests saturating a powder mixture with electrons to at least electrical neutrality according to the presently claimed invention. This portion of Mankiewicz states:

“the mechanisms involved could modify the concentration of oxygen and free electrons, thereby affecting the solubilities and availabilities of minerals at varying oxidation and reduction states. In microbial films, surface organisms use oxygen, while deeper within the film, using other electron acceptors, regulating the Eh or electron availability, facilitating anaerobic processes modifying mineral availability as well as pollutant removal capacity.”

See Mankiewicz at column 7, lines 43-51. It is not seen how this disclosure by Mankiewicz can be perceived as a teaching or suggestion to saturate a mixture in dry-powder form according to the present invention with electrons to at least electrical neutrality.

Furthermore, it is submitted that Mankiewicz fails to cure the other defects identified above with respect to Morgan. Mankiewicz fails to suggest modifying Morgan to provide a mixture in dry-powder form according to the present invention. As discussed above, Morgan discloses a mulch mass that is formed in aqueous foam. Mankiewicz fails to suggest modifying Morgan to provide a mixture that can form a film or membrane at some distance down in the soil mass when the mixture is spread over the soil surface, arranged in the soil mass, or both. Mankiewicz describes an artificial soil and would not have suggested modifying Morgan to provide a mixture for forming a film or membrane according to the presently claimed invention.

In view of the above comments, the claimed invention would not have been obvious from Morgan and Mankiewicz, and withdrawal of the rejection is requested.

35 USC § 103(a) Rejection over Morgan and Wake et al.:

The outstanding Office Action includes a rejection of claims 4 and 6 under 35 U.S.C. §103(a) over Morgan and JP 402195830 to Wake et al. This rejection is traversed.

It is understood that Wake et al. is actually JP 2195830. If the Examiner is referring to a different reference, it is requested that the Examiner clarify the rejection.

As discussed above, Morgan fails to disclose and would not have suggested a mixture in dry-powder form according to the presently claimed invention. Morgan describes mulch mats prepared from foamed slurries of fibers, granules, binder and surfactant in an aqueous medium. See Morgan at column 4, lines 8-9.

Wake et al. describe a filtrate of a cultured liquid of microalgae added as an artificial seed germination promoter to a basal medium, wherein the medium and a plant-producing tissue are imbedded in a water absorbing gel. See the English language abstract of Wake et al.

It is not seen how Wake et al. suggest modifying Morgan to achieve the presently claimed invention. Wake et al. fail to suggest modifying Morgan to provide a mixture that is saturated with electrons to at least electrical neutrality according to the presently claimed invention. Furthermore, Wake et al. would not have suggested modifying the mulch mat formed in an aqueous foam according to Morgan to achieve a mixture in dry-powder form according to the presently claimed invention. Furthermore, Wake et al. would not have suggested modifying Morgan to provide a mixture for forming a film or membrane wherein at least a portion of the film or membrane is formed at some distance down according to the presently claimed invention.

In view of the above comments, the claimed invention would not have been obvious from Morgan and Wake et al., and withdrawal of the rejection is requested.

35 USC § 103(a) Rejections over Morgan and Chiaffredo et al.:

The outstanding Office Action includes a rejection of claims 9 and 10 under 35 U.S.C. §103(a) over Morgan and U.S. Patent No. 5,441,877 to Chiaffredo et al. This rejection is traversed.

As discussed above, Morgan fails to disclose and would not have suggested a mixture in dry-powder form according to the presently claimed invention. Morgan describes mulch mats prepared from foamed slurries of fibers, granules, binder and surfactant in an aqueous medium. See Morgan at column 4, lines 8-9.

Chiaffredo et al. disclose a biologically enriched substrate containing organic matter rich in colonies of Cyanophycea and Bryophytes for rapid creation of natural vegetation on bare terrain. See Chiaffredo et al. at Abstract.

It is not seen how Chiaffredo et al. suggest modifying Morgan to achieve the presently claimed invention. Chiaffredo et al. fail to suggest modifying Morgan to provide a mixture that is saturated with electrons to at least electrical neutrality according to the presently claimed invention. Furthermore, Chiaffredo et al. would not have suggested modifying the mulch mat formed in an aqueous foam according to Morgan to achieve a mixture in dry-powder form according to the presently claimed invention. Furthermore, Chiaffredo et al. would not have suggested modifying Morgan to provide a mixture in dry-powder form wherein at least a portion of the film or membrane is formed at some distance down according to the presently claimed invention.

In view of the above comments, the claimed invention would not have been obvious from Morgan and Chiaffredo et al., and withdrawal of the rejection is requested.

35 USC § 103(a) Claim Rejections over Morgan and Wallace et al.:

The outstanding Office Action includes a rejection of claims 11, 12, and 58 under 35 U.S.C. §103(a) over Morgan and U.S. Patent No. 4,797,145 to Wallace et al. This rejection is traversed.

As discussed above, Morgan fails to disclose and would not have suggested a mixture in dry-powder form according to the presently claimed invention. Morgan describes mulch mats prepared from foamed slurries of fibers, granules, binder and surfactant in an aqueous medium. See Morgan at column 4, lines 8-9.

Wallace et al. disclose a method for improving the physical properties of soil by the application of aqueous mixtures of agricultural polyelectrolytes and polysaccharides to the soil. See Wallace et al. at Abstract.

It is not seen how Wallace et al. suggest modifying Morgan to achieve the presently claimed invention. Wallace et al. fail to suggest modifying Morgan to provide a mixture that is saturated with electrons to at least electrical neutrality according to the presently claimed invention. Furthermore, Wallace et al. would not have suggested modifying the mulch mat formed in an aqueous foam according to Morgan to achieve a mixture in dry-powder form according to the presently claimed invention. Furthermore, Wallace et al. would not have suggested modifying Morgan to provide a mixture in dry-powder form for forming a film or membrane wherein at least a portion of the film or membrane is formed at some distance down according to the presently claimed invention.

In view of the above comments, the claimed invention would not have been obvious from Morgan and Wallace et al., and withdrawal of the rejection is requested.

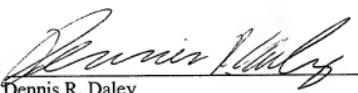
It is believed that this application is in condition for allowance. Early notice to this effect is earnestly solicited.



Respectfully submitted,

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